2. Safety Devices

※ We adapt 5 safety devices for users to use this wash machine safely.

1) Balancing device (ASSY-Main PCB)
   → When the lauandry is out of balance, to prevent the noises and vibrations, the unbalance detecting sensor helps the laundry laid even and continue the dehydating process.

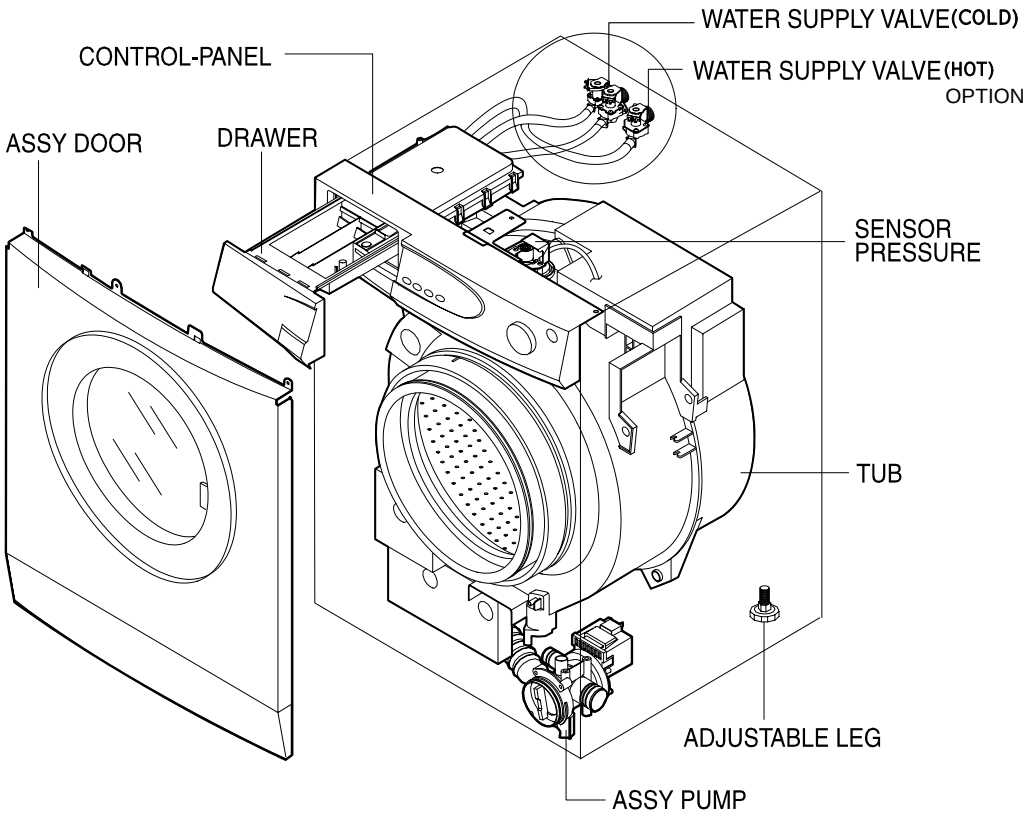
2) Anti-over water supply device
   → Because water supply value is broken, once water is supplied to the 2/3 level of the door, the water supplied is drained automatically.

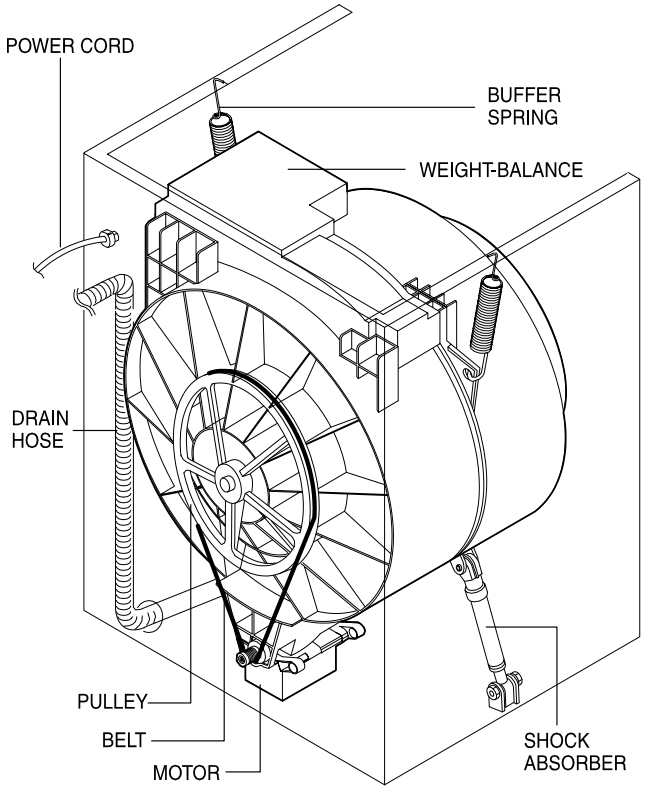
3) Temperature-regulating device(thermistor)
   → To prevent over-heating over the temperature setted up, THERMISTOR senses the temperature of the machine continuously and helps the wash machine to work at the temperature given by users.

4) Overheating- controlling system
   → Under the circumstances of THERMISTOR inferiority or abnormal condition, if wash-heater is overheated, automatically, assy -thermal fuse cuts off the power supply to protect the machine to keep it safe.

5) Delicate clothing safeguard function(ASSY-Main PCB)
   → To protect the clothings which is weak to high temperature, the wash machine senses the temperature inside the washing tub. if the temperature rises over 50℃ wool washing coure and Delicate washing course drain the water.

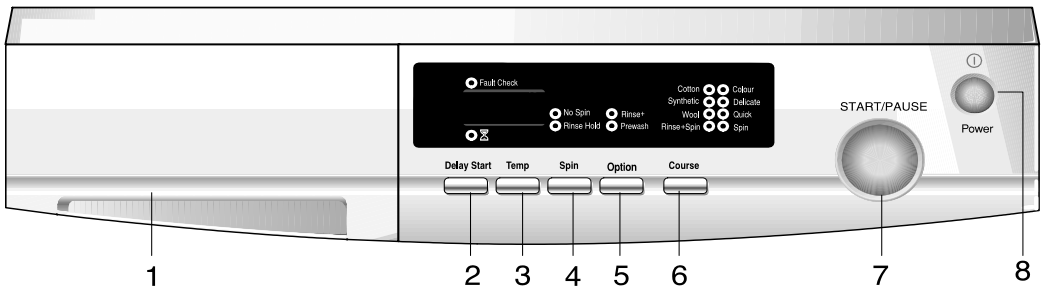
3. Overview of the Washing Machine





4. Overview of the control panel

S1093/S8093



1. Detergent dispenser

2. No Spin button

The laundry remains in the drum without being spun after the final drain.

3.Rinse Hold button

The laundry remains soaking in the final rinse water.
Before the laundry can be unloaded, the "Spin" program must be run.

4.Temperature selection button

Press the button repeatedly to cycle through the available water temperature options (cold water, 40 °C and 60 °C).
When pressing this button during washing, you can see the selected temperature in the display panel.

S1093	no rh,400,600,800,1000 rpm
S8093	no, rh,400,600,800,rpm

5.Option button

Press the button repeatedly to cycle through the available partial wash options {Rinse,+ Prewash, (Rinse+ + Prewash), Calcel Rinse+}
Note : Prewash is only available when washing cotton, colour, synthetic or delicate.

6. Course button

Press the button to select one of the eight available wash programs.
Cotton, Synthetic, Delicate, Quick, Rinse+Spin, Spin

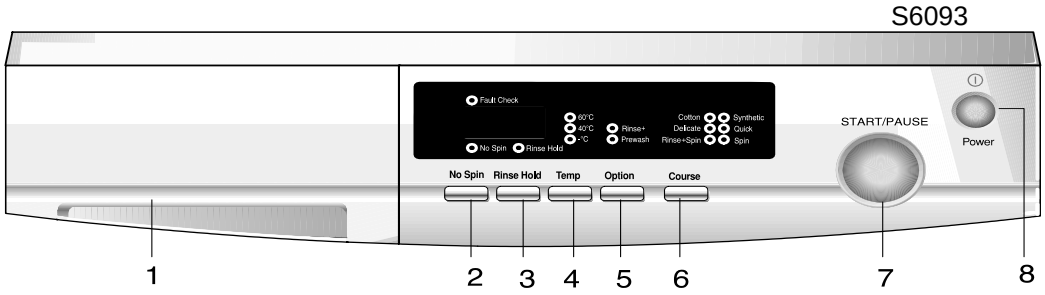
7. Start/Pause button

Press to pause and restart programs.

8. (On/Off) button

Press once to turn the washing machine on, press again to turn the washing machine off.
If the washing machine power is left on for longer than 10 minutes without any buttons being the power automatically turns off.

4. Overview of the control panel



1. Detergent dispenser

2. No Spin button

The laundry remains in the drum without being spun after the final drain.

3.Rinse Hold button

The laundry remains soaking in the final rinse water.
Before the laundry can be unloaded, the "Spin" program must be run.

4.Temperature selection button

Press the button repeatedly to cycle through the available water temperature options (cold water, 40 °C and 60 °C).
When pressing this button during washing, you can see the selected temperature in the display panel.

5.Option button

Press the button repeatedly to cycle through the available partial wash options {Rinse,+ Prewash, (Rinse+ + Prewash), Calcel Rinse+}
Note : Prewash is only available when washing cotton, colour, synthetic or delicate.

6. Course button

Press the button to select one of the eight available wash programs.
Cotton, Synthetic, Delicate, Quick, Rinse+Spin, Spin

7. Start/Pause button

Press to pause and restart programs.

8. (On/Off) button

Press once to turn the washing machine on, press again to turn the washing machine off.
If the washing machine power is left on for longer than 10 minutes without any buttons being touch the power automatically turns off.

5. Main function

1) Auto power S/W off function

- After power on, the auto power S/W off function automatically switches power off for you if you do not press selection button for 10 minutes.
- After selecting the function, the auto power S/W off function automatically switches power off for you if you do not press start/pause button for 10 minutes.
- until 5 minutes past, After finishing the last function, the auto power S/W off function automatically switches power off for you if you do not re-select the course button or manual button.

2) Door open function

- If door is open during the operating, all operating is halted and error melody will coming out.
- Door open error can be cleared by colosing the door. the operating keeps going on.

3) Rinse hold function

- If rinse hold function selected, the operating is finished , the machine do not drain the water after last rinse.

4) No spin function

- If no spin function selected, the operating is finished after last rinse.

5) Pre-washing function

- Pre-washing function can be selected ,when you choice the following mode; cotton, coloreds, sythetics, delicates,
- Water level/reverse time is the same with the selected course.
- Pre-washing takes about 15 minutes.

6) Rinse+ function

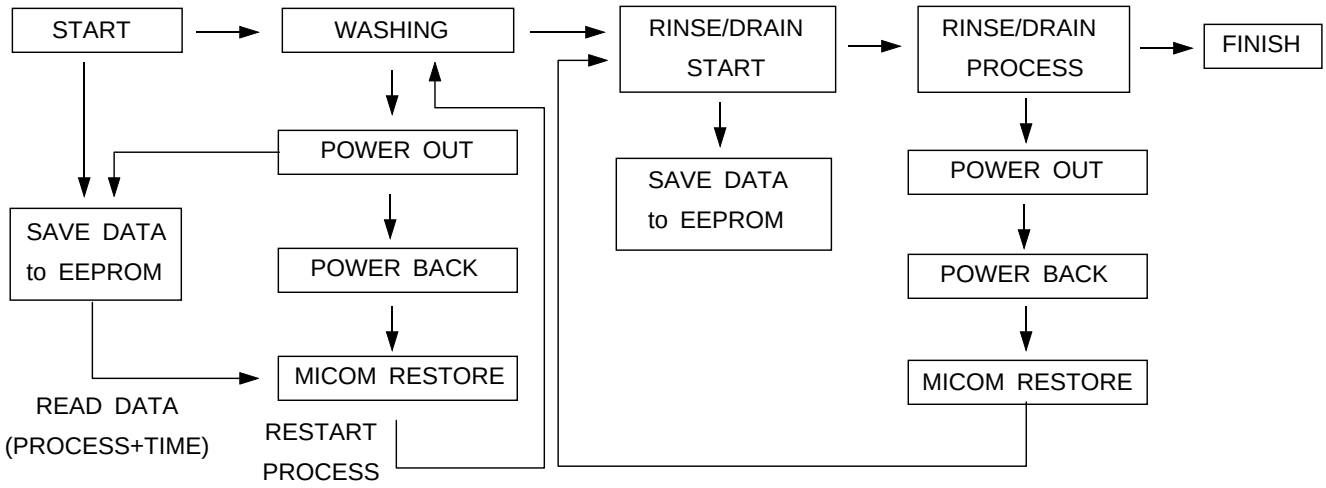
- This function practises rinse process once more

5. Main function

7) Power-out compensation function

- If power is out on selected process, the process before power out is stored to EEPROM, once power is back the process before power out continues.
- When power is back, washing process starts from the process at the point of the power out, rinse/drain process starts from the initial process.

POWER-OUT COMPENSATION FUNCTION PROCESS



8) Water heater Error function

① This function starts working, when the heater works abnormally.
(this function begins sensing the heater 2 minutes later, after the heater operating)

② The value of the initial thermistor(A1) is compared with that of the thermistor(A2) in 2 minutes (Y=A2-A1)
- For 10 minutates, the variance of temperature(Y) is less than 2℃.

③ The value of the initial thermistor(A1) is compared with that of the thermistor(A2) in 11 minutes (Y=A2-A1)
- For 1 minute the variance of temperature(Y) increases more than 7℃(0.3V).

④ At this time heater, error melody will coming out and all working process off

⑤ The heater operating continues during heating hours, if washing hour is left over, the residual washing process keeps going without heating.

5. Main function

9) Fuzzy washing function (weight-sensing)

☞ After finishing initial water supply, when the fall of the water level needs supplementary water supply, Sensing function perceives the weght with the supplementary water supply numbers and starts to work. Under the course of Cotton, or Coloureds, if the supplementary water supply numbers become 3 - 4 times the function is going at default condition (high water level), if 1-2 below that is going at middel level, if 0 below low water level, heating hours and rinse hours depend on the above data.

ECO PRE mode is selected, the process going on at default condition.

	Washing hours		Rinse water level
	Cotton	Coloureds	
High	Default	Default	Default
Middle	Default-12 min	Default-7min	22.80KHZ
Low	Default-25 min	Default-15min	23.30KHZ

※After sensing weight, above hours is decreased from above default hours

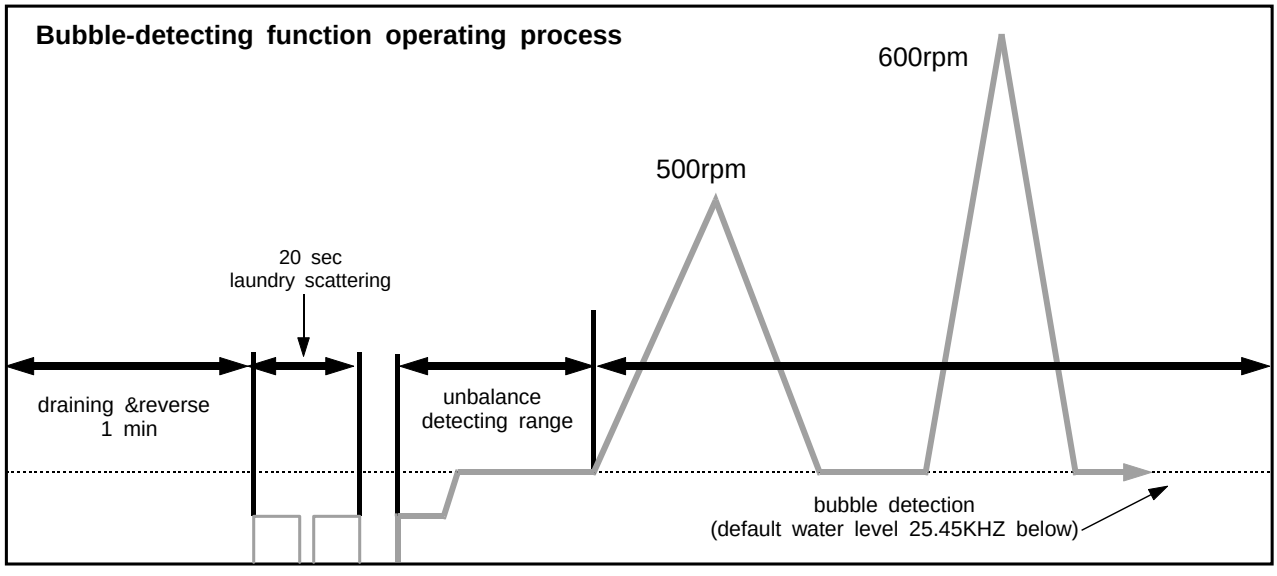
10) Bubble -detecting function

At the each condition of washing&dehydrating , rinse&dehydrating , hydrating, bubble -detecting function works, this function works 5times normally, if the function detects bubbles at 6 times , the bubble-detecting function stops and go on to the next process.

● The bubble-detecting function during washing & dehydrating to rinse & dehydrating
after 2 times instant dehydrating and before main dehydrating, if the water level is under 25.45KHZ, Bubble

→ Detecting function thinks there are bubbles and add the bubbles-removing rinse, needing hours are above hours and 8 min 40 sec.

→ The bubble-detecting function during single hydrating process
after 2 times instant dehydrating and before main dehydrating , if the water level is 25.45KHZ below or during main dehydrating, water level data is 23.80KHZ below Bubble-detecting function thinks there are bubbles and add the bubbles-removing rinse 1 times, needing hours are above hours and 5 min 55 sec.



5. Main function

11) Unbalance detecting & laundry balance positioning system

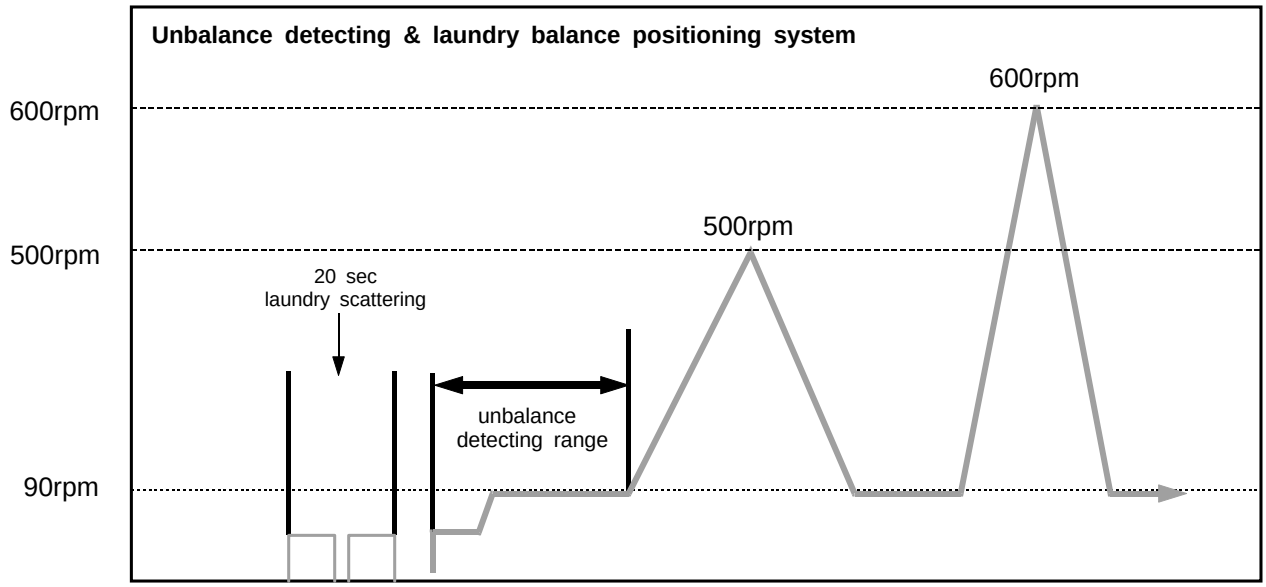
① Just before the hydrating process and just after reversal rotation for balancing laundry position, this function is carried out

② The initial 6 sec is the period of reversal rotation for balancing laundry position , Drum rotates 50rpm for initial 6 sec

③ Next 10 sec, the rotation increases the speed from 50 rpm to 90 rpm slowly

④ During the next 18 sec, drum rotates at the speed of 90 rpm, the sensor decides the degree of laundry unbalance with TACHO data which is attached to motor

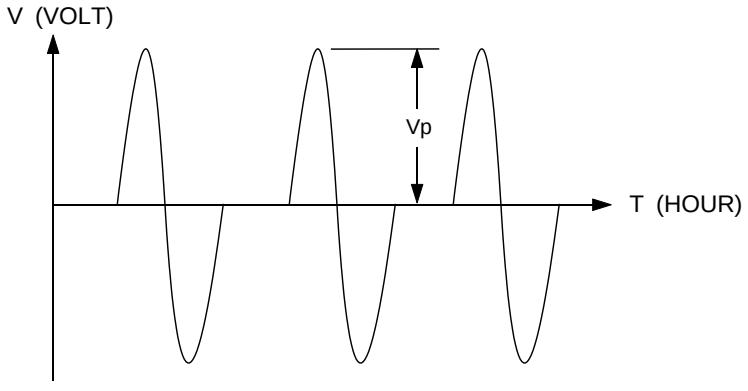
⑤ If the degree of unbalanced laundry is over 6 times to default value, laundry balancing system carryies out feed back process 6 times



12) R.P.M control

The rotating motor enables the magnetics(i.e generator) to generate magnetic flux in proportion to r.p.m, magnetic flux induced by coil sensor in the opposite side produces the wave like the figure below to dΦ/dt and via rectangual wave generating citcuit, the waves reaches MICOM and micom controlls r.p.m with the pulse, count and cycle inputted by program.

<COIL electrical wave at both ends>



6. Technical point

1) Motor on/off time at each course

unit:sec

Course	Washing				Rinse				Motor r.p.m
	Cw	Off	Ccw	Off	Cw	Off	Ccw	Off	
Cotton	13	3	13	3	10	5	10	5	50
Coloureds	11	4	11	4	10	5	10	5	50
Synthetics	7	8	7	8	7	8	7	8	40
Delicates	5	10	5	10	5	10	5	10	30
Wools	2	58	2	58	2	28	2	28	25
Quick	12	3	12	3	10	5	10	5	45

※ Motor on/off time is measured in cold water, in heating time motor on/off time is 10 sec on and 5sec off in the cotton course, beside cotton course, in the other course motor on/off time is the same with that of cold water use.

2) Final dehydrating r.p.m at each course

unit:rpm

Model / Course	S1093	S8093	S6093
Cotton	1000	800	600
Coloureds	1000	800	600
Synthetics	800	800	600
Delicates	600	600	600
Wools	400	400	400
Quick	1000	800	600

※ You can change the r.p.m to the above a table by use spin button under no spin situation.

3) The water supply control at each process cycle

Model / Process cycle	S1093/S8093/S6093
Washing	Cold water 4.5L/min + cold 10L/min
Rinse	Cold 10L/min
Final rinse	Cold water 4.5L/min + cold 10L/min

6. Technical point

4) The water level data at each course

unit:Khz

Course \ Water level		Default water level(khz)		Supplemetary water START(Khz)	Supplemetary water end(khz)
Cotton	Washing	23.50		24.00	23.70
	Rinse	large	22.45	24.00	23.50
		middle	22.80		
		small	23.30		
Coloureds	Washing	23.50		24.00	23.70
	Rinse	22.45		24.00	23.50
Synthetics	Washing	23.50		24.00	23.70
	Rinse	22.45		24.00	23.50
Delicates	Washing	22.80		23.55	23.35
	Rinse	22.65		23.55	23.35
Wools	Washing	22.45		23.35	23.00
	Rinse	22.15		23.35	23.00
Quick	Washing	23.50		24.00	23.70
	Rinse	22.45		24.00	23.50

5) The other water level data

unit:Khz

The water data unter each conditon		
1st water supply (only preparation)	24.60	1st water supply level to washing tub
Overflow error	20.50	The water supplied reach 2/3 of door
Bubble detectingatwashing/rinse/dehydrating	25.45	Bubble -detecting water level
Bubble detecting rinse water level	22.00	The water level which can detect bubbles
Water level which can open door	23.80 over	It is possible to open the door
Water level which can drive heater	24.50	Safety water level of wash heater
Water level which can reset the drain	24.50	The water level can be detected after 1st draining

※ If water level is 15KHZ below or 30 KHZ above , sensor-pressur is out of order so needs changing.

7. General Error Function

ı When an error occurs, this function starts to keep generating error melody sounds and displays error indicators as shown in the followings per corresponding error by blinking in 0.5sec interval until the error status is completely cleared out. In this case, all the driving devices are turned off until the error is cleared out.

1. WATER SUPPLY ERROR
- Display shows ' E1' .
- Water Supply Error occurs when water level frequency does not show changes more than 100Hz or water is not supplied up to the water level presetting for 20 min or more at the time of initial water supply.
- The error status can be cleared by turning POWER S/W OFF and resuming the POWER ON initial status.

2. WATER DRAIN ERROR
- Display shows ' E2' .
- In case the water level frequency is 24.5KHz or less in the initial phase of UNB-detecting cycle.
- Water Drain error can be cleared by turning POWER S/W OFF and resuming the POWER ON initial status.

3. OVER-FLOW ERROR
- Display shows ' E3' .
- Over-Flow error occurs when the water level is in abnormal operation. It can be cleared by turning POWER S/W OFF. Water is drained prior to POWER S/W OFF and it is forced to be drained for 2 min if a frequency of more than 24.5 KHz is detected.

4. DOOR OPEN ERROR
- Display shows ' door' or 'Ed'
- Door Open error can be cleared by closing the door.

5. UNBALANCE ERROR
- Display shows ' E4' .
- Laundry load is unbalanced; loosen any tangled laundry.
- If only one item of clothing needs washing, such as a bathrobe or jeans, the final spin result might be unsatisfactory and an "E4" error message will be shown in the display window.
- Unbalance error is cleared by POWER S/W OFF and by resuming the POWER ON initial status.

6. WATER HEATER ERROR
- Display shows ' E5,E6' .
- In case the water temperature rises by 7°C or more in 1 min. or by 2°C less in 10 min after heating is started.
- It can be cleared by turning POWER S/W OFF.

7. ASS' Y PRESSURE S/W ERROR

* Generated Frequency Signal of WATER LEVEL(W/L) S/W (KHz)

Level	Low Level	High Level
Abnormal W/L Frequency	30.00 KHz	15.00 KHz

- If the same signal as the above table is detected for more than 5 seconds, it is a PRESSURE S/W Error.
- When the error occurs, water drain pump will operate for 3 min. and then turn off the water drain pump. Then the display shows ' E7' indicating a pressure s/w error indicator.

8. ABNORMAL WATER TEMPERATURE ERROR

Course	Water Temp
Delicate	50°C or more
Wool	50°C or more

- In case the water temperature is 50°C or more in Delicate and Wool course.
- At the time of initial water supply, if the water temperature is not appropriate, water starts to be drained and it is forced to be drained for 2 min when the abnormal frequency of 24.5KHz is detected.
- Display shows ' E8' .
- This error can be cleared by POWER S/W OFF.

9. WATER LEAKAGE ERROR (E9)
- Water Leakage error occures when water is drained naturally after washing program starts.

7. General Error Function

10. Tacho Error
- This error occurs in case motor thaco is out of order or tacho siganals inputted are fewer than 2
- "EA" displayed
- This error can be cleared by power s/w off

11. Motor Triac short Error
- This error occurs in case over 300 per 1 sec tacho signals are inputted power S/w should be off.
- "Eb" diplayed.
- This error can be cleared by power s/w off

12. Thermistor error
- This error occurs, when Thermistor circuit is abnormal or the detected electrical volt is 0.2v below or 4.5v over
- "Ec" displayed
- This error can be cleared by power s/w off